ABSTRACT

An electromagnetic sensor capable of maintaining its accuracy through temperature cycling is provided. The sensor element material of an electromagnetic sensor is covered by an encapsulant having substantially similar thermal expansion values as the sensor element material. By matching the thermal expansion values of the components, changes in component orientation may be minimized during temperature cycling thus reducing the need for recalibration of the sensor assembly. In one embodiment the encapsulant is doped with a ceramic material or glass microspheres to achieve a thermal expansion coefficient similar to the thermal expansion coefficient of the copper sensor element material.

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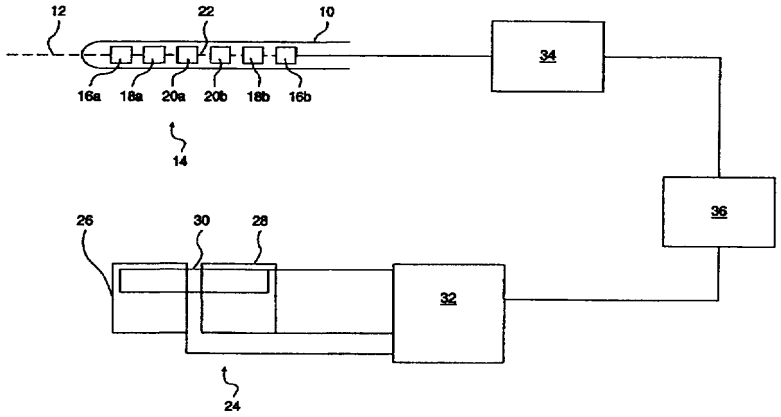

(57) Abstract

This invention is a system, a method for tracking the position, and orientation of a probe such as a catheter whose transverse inner dimension may be at most about 2 millimeters. Three planar antennas (26, 28, 30) that at least partly overlap are used to transmit electromagnetic radiation simultaneously, with the radiation transmitted by each antenna (26, 28, 30) having its own spectrum. In the case of single–frequency spectra, the antennas (26, 28, 30) are provided with mechanisms for decoupling them from each other. A receiver (10) inside the probe includes sensors (16a, 16b, 18a, 18b, 20a, 20b) of the three components of the transmitted field, with sensors (16a, 16b, 18a, 18b, 20a, 20b) for at least two of the three components being pairs of sensors (16a, 16b, 18a, 18b, 20a, 20b), such as coils, disposed symmetrically with respect to a common reference point.